

CLAIMS

1. An encoder for encoding a first bit stream,  
comprising:

means for generating a second bit stream from the first  
bit stream, the second bit stream having one or  
5 more different corresponding bit values than the  
first bit stream; and

means for encoding the second bit stream.

2. The encoder of Claim 1, wherein the means for  
encoding comprises a constitute encoder.

10 3. The encoder of Claim 1, wherein the means for  
generating a second bit stream comprises at least one of a  
ones complemeter and a differential encoder.

4. An encoder for encoding a first bit stream,  
comprising:

15 means for generating a second bit stream from the first  
bit stream, the second bit stream having one or  
more different corresponding bit values than the  
first bit stream;

means for generating a first bit and a second bit for  
20 each bit in the first bit stream; and

means for generating a third bit and a fourth bit for  
each bit in the second bit stream.

5. The encoder of Claim 4, wherein the means for  
generating a second bit stream comprises at least one of a  
25 ones complemeter and a differential encoder.

6. An encoder for encoding a first bit stream, comprising:

means for generating a first encoder first bit and a first encoder second bit for each bit in the first bit stream;

means for generating a second bit stream from the first bit stream, the second bit stream having one or more different corresponding bit values than the first bit stream;

means for generating a second encoder first bit and a second encoder second bit for each bit in the second bit stream; and

means for multiplexing the first bit stream, the first encoder first bit, the first encoder second bit, the second encoder first bit, and the second encoder second bit.

7. The encoder of Claim 6, wherein the means for generating a first encoder first bit and a first encoder second bit comprises a constitute encoder.

8. The encoder of Claim 6, wherein the means for generating a second encoder first bit and a second encoder second bit comprises a constitute encoder.

9. The encoder of Claim 6, wherein the means for generating a second bit stream comprises at least one of a ones complemeter and a differential encoder.

10. The encoder of Claim 6, further comprising means for interleaving at least one of the first bit stream and the second bit stream.

11. A method for encoding a first bit stream,  
comprising:

receiving the first bit stream;

encoding the first bit stream with a first encoder to  
5 generate a first encoder first bit and a first  
encoder second bit for each bit in the first bit  
stream;

generating a second bit stream from the first bit  
stream, the second bit stream having one or more  
10 different corresponding bit values than the first  
bit stream;

encoding the second bit stream with a second encoder to  
generate a second encoder first bit and a second  
encoder second bit for each bit in the second bit  
15 stream; and

multiplexing the first bit stream, the first encoder  
first bit, the first encoder second bit, the  
second encoder first bit, and the second encoder  
20 second bit.

12. The method of Claim 11, further comprising  
generating a reordered bit stream to change the ordering of  
the bits in at least one of the first bit stream and the  
second bit stream.

13. The method of Claim 11, wherein the step of  
25 generating a second bit stream comprises at least one of a  
ones complemeter and a differential encoder.

14. A method for encoding a first bit stream,  
comprising:

receiving the first bit stream;

encoding the first bit stream with a first encoder to generate a first encoder first bit and a first encoder second bit for each bit in the first bit stream;

5 generating a second bit stream from the first bit stream, the second bit stream having one or more different corresponding bit values than the first bit stream;

10 generating an interleaved bit stream from the second bit stream;

encoding the interleaved bit stream to generate a second encoder first bit and a second encoder second bit for each bit in the interleaved bit stream; and

15 multiplexing the first bit stream, the first encoder first bit, the first encoder second bit, the second encoder first bit, and the second encoder second bit.

20 15. The method of Claim 14, wherein the step of encoding the first bit stream further comprises utilizing a constitute encoder to generate a first encoder first bit and a first encoder second bit.

25 16. The method of Claim 14, wherein the step of encoding the interleaved bit stream further comprises utilizing a constitute encoder to generate a second encoder first bit and a second encoder second bit.

17. The method of Claim 14, wherein the step of generating a second bit stream comprises at least one of a ones complementer and a differential encoder.

18. A decoder for decoding a first bit stream of received bits, comprising:

first decoding means for converting a stream of first decoder first bits, a stream of first decoder second bits, the first bit stream, and a second stream of probability values that the corresponding received bit is a one from an early iteration, to a first stream of probability values that the corresponding received bit is a one;

first sign inverting means for inverting the signs of the first stream of probability values;

means for generating a second bit stream from the first bit stream, the second bit stream having one or more different corresponding bit values than the first bit stream;

second decoding means for converting the first stream of probability values, the second bit stream, a stream of second decoder first bits, and a stream of second decoder second bits, to a second stream of probability values that the corresponding bit of the second bit stream is a zero; and

second sign inverting means for inverting the signs of the second stream of probability values.

19. The decoder of Claim 18, further comprising an interleaver means for reordering at least one of the first bit stream and the second bit stream.

20. The decoder of Claim 18, wherein the means for generating a second bit stream comprises at least one of a ones complemener and a differential encoder.

21. A decoder for decoding a first bit stream of received bits, comprising:

first decoding means for converting a stream of first decoder first bits, a stream of first decoder second bits, the first bit stream, and a second stream of probability values that a corresponding received bit is a one from an early iteration, to a first stream of probability values that the corresponding received bit is a one;

first decoder interleaver means for reordering the stream of probability values to the order required by a second decoder;

first sign inverting means for inverting the signs of the first stream of probability values;

second decoder interleaver means for reordering the stream of received bits to the order required by the second decoder;

means for generating a second bit stream of the reordered bits, the second bit stream having one or more different corresponding bit values than the reordered bits produced by the second decoder interleaver means;

second decoding means for converting the first stream of probability values, the second bit stream, a stream of second decoder first bits, and a stream of second decoder second bits, to a second stream of probability values that the corresponding bit of the second bit stream is a one;

de-interleaver means for reordering the second stream of probability values for reordering the second stream of probability values to the order required by the first decoder;

second sign inverting means for inverting the signs of  
the second stream of probability values; and  
decision unit means for allowing one or more iterations  
of determining the second stream of probability  
values.

22. The decoder of Claim 22, wherein the means for  
generating a second bit stream comprises at least one of a  
ones complemeter and a differential encoder.

23. A method for decoding a first bit stream of  
received bits, comprising:

converting a stream of first decoder first bits, a  
stream of first decoder second bits, the first bit  
stream, and a second stream of probability values  
from an early iteration, to a first stream of  
probability values that the corresponding bit of  
the first bit stream is a one;

inverting the signs of the first stream of probability  
values;

generating a second bit stream from the first bit  
stream, the second bit stream having one or more  
different corresponding bit values than the first  
bit stream;

converting the first stream of probability values, the  
second bit stream, a stream of second decoder  
first bits, and a stream of second decoder second  
bits, to a second stream of probability values  
that the corresponding bit of the second bit  
stream is a zero;

inverting the signs of the second stream of probability  
values; and

repeating the above steps a specified number of iterations.

24. The method of Claim 23, further comprising interleaving at least one of the first bit stream and the  
5 second bit stream.

25. The method of Claim 23, wherein the step of generating a second bit stream comprises at least one of a ones complementer and a differential encoder.

26. A method of decoding a first bit stream of  
10 received bits, comprising:

converting a stream of first decoder first bits, a stream of first decoder second bits, the first bit stream, and a second stream of probability values that the corresponding received bit is a one from  
15 an early iteration, to a first stream of probability values that the corresponding bit in the first bit stream is a one;

reordering the first stream of probability values to the order required by a second decoder;

20 inverting the signs of the first stream of probability values;

interleaving the first bit stream of received bits to the order required by the second decoder, creating a reordered bit stream;

25 generating a second bit stream of the reordered bits, the second bit stream having one or more different corresponding bit values than the first bit stream;



converting the first stream of probability values, the  
second bit stream, a stream of second decoder  
first bits, and a stream of second decoder second  
bits, to a second stream of probability values  
5 that the corresponding bit of the ones complement  
bit stream is a zero;

de-interleaving the second stream of probability values  
for reordering the second stream of probability  
values to the order required by the first decoder;  
10 inverting the signs of the second stream of probability  
values; and

repeating the above steps a specified number of  
iterations.

27. The method of Claim 26, wherein the step of  
15 generating a second bit stream comprises at least one of a  
ones complemeter and a differential encoder.

28. A signal representing a bit stream, comprising for  
each original bit of the bit stream:

a first bit identical to the original bit;

20 a first plurality of bits representing an encoding by  
one or more encoders of the original bit; and

a second plurality of bits representing an encoding by  
one or more encoders of a modified bit, the  
modified bit being generated by applying at least  
25 one of a ones complemeter and a differential  
encoder, wherein the first bit, the first  
plurality of bits, and the second plurality of  
bits are multiplexed together.

29. An apparatus comprising an encoder for encoding a  
30 first bit stream, comprising:

means for generating a second bit stream from the first bit stream, the second bit stream having one or more different corresponding bit values than the first bit stream;

5 means for encoding a first bit and a second bit for each bit in the first bit stream; and  
means for encoding a third bit and a fourth bit for each bit in the second bit stream.

10 30. The apparatus of Claim 29, wherein the means for generating a second bit stream comprises at least one of a ones complemeter and a differential encoder.

31. An apparatus comprising an encoder for encoding a first bit stream, comprising:

15 means for generating a first encoder first bit and a first encoder second bit for each bit in the first bit stream;

20 means for generating a second bit stream from the first bit stream, the second bit stream having one or more different corresponding bit values than the first bit stream;

means for generating a second encoder first bit and a second encoder second bit for each bit in the second bit stream; and

25 means for multiplexing the first bit stream, the first encoder first bit, the first encoder second bit, the second encoder first bit, and the second encoder second bit.

30 32. The apparatus of Claim 31, wherein the means for generating a second bit stream comprises at least one of a ones complemeter and a differential encoder.

33. A module comprising an encoder for encoding a first bit stream, comprising:

means for generating a first encoder first bit and a first encoder second bit for each bit in the first bit stream;

means for generating a second bit stream from the first bit stream, the second bit stream having one or more different corresponding bit values than the first bit stream;

means for generating a second encoder first bit and a second encoder second bit for each bit in the second bit stream; and

means for multiplexing the first bit stream, the first encoder first bit, the first encoder second bit, the second encoder first bit, and the second encoder second bit.

34. An apparatus comprising a decoder for decoding a first bit stream of received bits, comprising:

first decoding means for converting a stream of first decoder first bits, a stream of first decoder second bits, the first bit stream, and a second stream of probability values that the corresponding received bit is a one from an early iteration, to a first stream of probability values that the corresponding received bit is a one;

first sign inverting means for inverting the signs of the first stream of probability values;

means for generating a second bit stream from the first bit stream, the second bit stream having one or more different corresponding bit values than the first bit stream;

second decoding means for converting the first stream of probability values, the second bit stream, a second decoder first bit, and a second decoder second bit, to a second stream of probability values that the corresponding bit of the second bit stream is a zero; and

second sign inverting means for inverting the signs of the second stream of probability values.

35. A module comprising a decoder for decoding a first bit stream of received bits, comprising:

first decoding means for converting a stream of first decoder first bits, a stream of first decoder second bits, the first bit stream, and a second stream of probability values that the corresponding received bit is a one from an early iteration, to a first stream of probability values that the corresponding received bit is a one;

first sign inverting means for inverting the signs of the first stream of probability values;

means for generating a second bit stream from the first bit stream, the second bit stream having one or more different corresponding bit values than the first bit stream;

second decoder means for converting the first stream of probability values, the second bit stream, a second decoder first bit, and a second decoder second bit, to a second stream of probability values that the corresponding bit of the second bit stream is a zero; and

second sign inverting means for inverting the signs of the second stream of probability values.